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(54) Abstract Title
Restricting operation of mobile communication devices in a designated area

(57) A network comprises a number of certified terminals 22 which are capable of restricting certain aspects of a mobile communication device's 3 operation whilst in a designated area. The certified terminals may be programmed via the switched telephone network or via a chip card. The programming of the terminal is authorised by a network operator to prevent interference with adjacent base stations and to control the areas to which the restrictions are applied. The terminal may be programmed with parameters which relate to the power, duration or classes of priority of the mobile devices that are to be inhibited. Additionally, a network operator may broadcast a general inhibition instruction to mobiles in certain cells of the network. If a network operator subsequently decides an area of restricted operation provided by a certified terminal should no longer exist, a list of certified terminals to be ignored by mobile devices may be broadcast.

Fig. 1

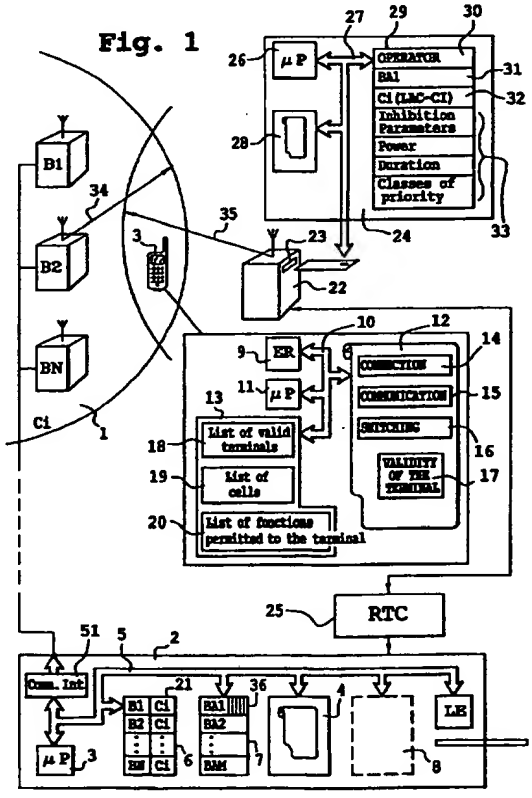

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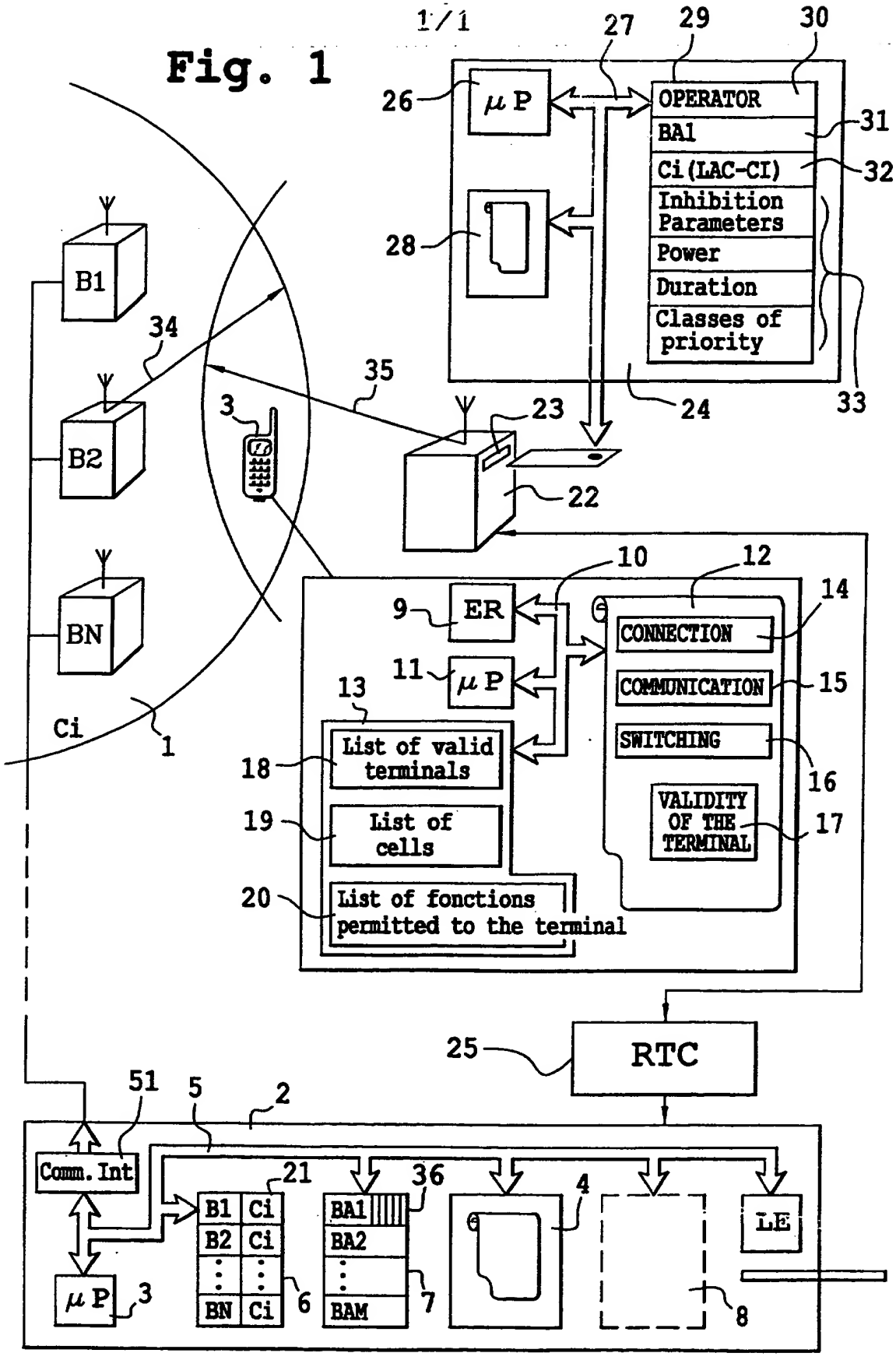
Fig. 1


26
μP
27
29
30
OPERATOR
BA1
Ci(LAC-CI)
Inhibition Parameters
Power
Duration
Classes of priority
31
32
33
28
24
23
22
B1
B2
BN
34
35
3
Ci
1
10
12
14
9
ER
CONNECTION
11
μP
COMMUNICATION
15
13
SWITCHING
16
18
List of valid terminals
VALIDITY OF THE TERMINAL
17
19
List of cells
20
List of fonctions permitted to the terminal
25
RTC
51
5
2
Comm. Int
21
36
4
LE
B1 Ci
B2 Ci
BN Ci
BA1
BA2
BAM
μP
3
6
7
8

METHOD FOR THE MANAGEMENT OF TRAFFIC IN A MOBILE TELEPHONY NETWORK

An object of the invention is a method for the management of traffic in a mobile telephony network. In this respect, it also relates more particularly but not only to GSM type networks. The aim of the invention is to make the use of such mobile telephony networks more acceptable.

The great increase in the number of mobile telephones and their use in public places has two drawbacks. Firstly, the RF transmissions of the mobile (which are spontaneous for localizing operations or requested by the network or user for incoming or outgoing calls) are harmful in certain places for reasons of security. This is especially so in aircraft and hospitals. Secondly, the local noises from the mobiles such as ringing sounds or the voice of the user who is required to speak are a nuisance to his environment. This is especially so in theaters and churches.

Various approaches have been proposed for each of these problems or for both of them. Certain approaches entail the use of equipment integrated into the infrastructure of the network. The operator of the network may, for example, adapt his infrastructure so that it locates the mobiles that are in the region to be protected. Typically, he sets up an infrastructure cell that coincides with the region to be protected. He then deals with these mobiles particularly by not delivering certain signals that allow them to operate or by giving them explicit inhibiting commands that reduce their operation in various degrees. Other approaches comprise equipment separated from the infrastructure. In this case, a low-power transmitter terminal is installed to jam the signals of the network in the region to be protected or deliver explicit inhibiting commands which the mobile is structured to accept as commands having priority over signals from the network. An approach of this kind is described for example in the document WO-98/56130. This type of approach is expected to be more flexible.

However, all these approaches are taking time to get established because of an unresolved conflict of interest between the mobile telephony operator, the owner or manager of the premises in which the RF signals are transmitted or picked up and the user of the mobile telephone. In particular, the operator pays a license for the use of a frequency band, and his aim is

that the mobiles should communicate as much as possible. The user pays a subscription for a service and does not wish to be unduly deprived of it. The owner or manager of the premises in which transmission is made or the public authorities, for their part, are entitled to peace and security. Their rights require the curtailment of the rights of the operator and the user, and may even necessitate transmission on the operator's frequencies.

The solutions integrated into the infrastructure are cumbersome and disadvantageous to the owner of the premises. He therefore needs to obtain recognition of the inconvenience suffered by him and get the operator to modify his infrastructure. This may be a lengthy process. The solutions that are separated from the infrastructure are more convenient but may lead to anarchy. For example, if owners of premises are allowed to freely set up disabling terminals, these terminals might spread uncontrolledly and cause unusual disturbance to the service.

The approach proposed in the invention to resolve this problem is to enable the use of terminals that are separated from the infrastructure but remain under the control of the operator who is himself supervised by the regulatory authority. These separated terminals under control will be known as certified terminals. They will be separated in the sense, especially, that they will not be designed to act as base stations of a network of this kind, namely to convey useful calls from the mobiles within their range, but only to participate in the organization of the traffic. According to the invention, the operator will exert control in three ways:

- the certified terminal is declared to the operator: in fact it is from the operator that the owner of the premises will obtain the terminal or at least an operating key,

- the mobiles that enter the coverage zone of this terminal verify the validity of the terminal,

- the infrastructure broadcasts related information to the mobiles to enable this verification. Thus, the solution of the invention enables the speedy installation of a terminal to resolve an urgent or temporary problem.

The operator is in the loop. At the outset, he may block requests that are clearly excessive. Then, he may reflect on a possibly more permanent solution. In the event of dysfunction, he may broadcast information on the infrastructure enabling the mobiles to ignore a terminal.

The owner of the premises requests the operator to protect his area. This request comprises a statement on the premises, the size of the area, and the degree of inhibition sought. Depending on the type of need, the operator may decide to set up the protection by modifying his infrastructure or else he may permit the use of a certified inhibiting terminal. If the operator instantaneously decides to permit a certified terminal, he gives the owner of the premises a set of codes for the operation of the terminal. Typically, this terminal takes the form of a chip card containing a lock for the terminal, appropriate operating parameters (degree of inhibition, location with respect to the cells of the infrastructure, transmission power), a terminal identity and/or a period of validity of authorization. Or else, the set of codes is handed over by downloading from the switched telephone network during a session in which the certified terminal is connected with the operator's services. If he needs to think matters over, the operator may nevertheless deliver an authorization as above, but for a short period until a lasting solution has been defined.

The terminal can then go into operation. The mobiles in the protected area pick up signals from the normal infrastructure, which give rise to a certain type of operation, and signals from the terminal which induce a restricted operation. The signals from the terminal tell the mobile what it should do such as maintaining acoustic silence or radio silence, not obeying certain commands from the infrastructure, etc., depending on the different classes of priority or functionality of the terminals and time slots etc.

An object of the invention therefore is a method for the management of traffic in a mobile telephony network in which:

- communications terminals are installed in a territory to enter into communication with mobile telephones,

- circuits of these terminals are parametrized in order that they may correspond to an expected use,

characterized in that:

- parametrizing signals are transmitted to certified communications terminals to parametrize these certified terminals, this parametrization configuring these certified terminals for an expected used of a type different from that of the communications terminals.

The invention will be understood more clearly from the following description and the appended figure. This figures is given purely by way of an indication and in no way restricts the scope of the invention. The single figure 1 gives a schematic view of a mobile telephony network and the structure of the different means used to implement the method of the invention.

Figure 1 shows a network that can be used to implement the method of the invention. The network 1 is a mobile telephony network and comprises a certain number of base stations B1, B2, BN connected to a central transmission and switching circuit 2. The base stations B1 to BN or communications terminals are installed in a territory and are used for communication with mobile telephones such as 3. The base stations conventionally comprise equipment for transmission and reception, frequency organization, temporal window organization and encoding organization to suit different known types of methods of transmission (TDMA, FDMA, CDMA). In the central circuit 2, an operating system comprising an arithmetic and logic unit 3 and the associated programs 4 is connected by means of a bus 5 with a communications interface 51 linked to the terminals B1 to BN. This link may be a specialized link formed by copper wires, coaxial cables or optic fibers or it may use a common switched telephone network or STN. The bus 5 is also connected according to the invention with a set of memories 6 and 7 specific to the invention. It is furthermore connected to other known types of equipment 8.

The mobile telephones 3 are provided with electronic circuits essentially comprising transmission/reception circuits 9 connected by a bus 10 with a microprocessor 11 and a program memory 12 as well as a data memory 13. The program memory 12 has sub-programs 14 for connection to a communications terminal B1 to BN, communications sub-programs 15 enabling the control of the transmission/reception circuits 9 and switching sub-programs 16 capable of ensuring the mobility of the mobile telephone 3. The switching sub-programs 16 manage the continuing localization of the mobile telephones when it is not in communication. When it is in communication, these programs 16 manage the hand-over operators, namely the transfer of communications between the mobile and a terminal B1 and the mobile and a terminal B2.

According to the invention, the switching sub-program 16 will comprise a program element 17 to verify the validity of a new terminal B2 with which it gets linked up. To this end, in its data memory 13, a mobile telephone could contain a list 18 of the valid terminals and/or a list 19 of the radiating terminals in which valid terminals are authorized to radiate and/or a list 20 of the functions allowed to the terminals with which it links up.

Corresponding to the list of the cells, the central circuit 2 will comprise recordings such as 21 in the memory 6 . These recordings will give firstly a terminal identity B1 and secondly a cell identity Ci in which the terminal B1 is located.

In fact, the terminals B1, B2 and BN are parametrized essentially in radiating power ,so that each of them covers a particular zone, and in usable frequencies, especially in a range of frequencies granted to an operator.

According to the invention, the network will have certified terminals 22. These certified terminals will fundamentally have the same equipment as the communications terminals B1 to BN. However, they will have parametrization to enable them to perform various types of operation different from the operation of the communications terminals. Typically, they will be able to ensure an incoming hand-over, namely accept mobile telephones that enter their coverage zone. They will also be able to prevent an outgoing hand-over, namely a hand-over in which a mobile that is in communication while it is in their coverage zone might be able to continue its call when it passes into the coverage of another terminal.

For the parametrization, the terminal 22 will be connected to the central circuits 2 essentially in two ways. In a first way, the terminal 22 will have a chip card reader 23 and will receive, for its parametrization, a removable chip card 24 provided with the codings necessary for parametrizing the terminal 22. According to another method, the terminal 22 will be connected to the switched telephone network or STN 25 and, during a session of connection with the central circuits 2, it can be parametrized accordingly. The chip card 24 gives a schematic view of the means of carrying out a parametrizing operation. The card 24 has a microprocessor 26 connected by a bus 27 to a program memory 28 and to a data memory 29. The data memory 29 essentially contains the information that the microprocessor 26 of the program 28 must store in the certified terminal 22

in operation. These information elements will by used by the mobile telephone in particular to measure the validity of the terminal 22.

These information elements essentially comprise a designation 30 of the operator who manages the central circuit 2 and therefore authorizes the installation of the terminal 22 in order to interfere with the operation of his terminals B1 to BN. This information also comprises a piece of information 31 pertaining to an identity, in this case BA1, of the certified terminal 22. They also comprise an identity Ci of a cell in which the terminal 22 is supposed to be set up. This identity Ci is a standardized type of identity, for example of the LAC-CI or Local Area Code-Cell Identity type. The presence of this identity information Ci enables the mobile to know that the certified terminal 22 has not been shifted from the place agreed between the owner or manager of the premises and the operator. Naturally, in a known way, the memory 29 will have information elements 33 that are inhibition parameters. These inhibition parameters may relate to the power, duration and classes of priority of the mobile telephones that have to be inhibited.

The following is the method of the invention. When a mobile telephone is located within the zone of coverage 34 of a communications terminal, it may also be within the zone of coverage 35 of the certified terminal 22. In the zone of coverage 35, it must comply with the inhibition constraints that are transmitted to it by the terminal 22. To this end, the terminal B2 sends the mobile telephone a piece of information on the identity BA1 of the terminal 22. The telephone 3 stores this information in the list 18. The terminal B2 for its part also sends the telephone the identity Ci of the authorized cell that it stores in its list 19. It can also send the telephone the list of the inhibition functions allowed to the terminal BA1. All these pieces of information are sent by the terminal B2 because it can take pick them up in a central circuit 2, in a memory 7, when the mobile telephone 3 states that it is receiving beacon transmissions from the certified terminal 22. Indeed, in the memory 7, a recording 36 has all these characteristics of the terminal BA1 needed for the comparison. The memory 7 furthermore has the list of all the other terminals certified by the operator of the network 1. As the case may be, the list 7 or the sub-list pertaining to the certified terminal BA1 may be stored in the storage circuits of the terminal B2 which can send them to the telephone 3 without going through the central circuit 2.

As it then possesses the information on the terminal 22, the mobile telephone 3, when it picks up the inhibition information sent by the terminals B2, can ascertain that the information 31 to 33 sent by this terminal 22 is compatible with the information received previously from the terminal B2. If this compatibility is satisfactory, the inhibition parameters 33 are applied to the mobile telephone 3 and the call is organized accordingly. In practice, it is entirely or partly inhibited.

The inhibition is of a known type. In practice, the programs 14 to 16 of the mobile telephone may comprise operations for taking account of these inhibitions to limit the action of the transmission/reception circuits 9.

If need be, the terminal B2 may require the mobile telephone 3 to transmit signals representing its identity, or an element of its identity, especially its priority class. In this case, the certified terminal 22 will compare the priority class of the mobile telephone 3 with the priority class of the mobile telephones that it is permitted to neutralize. The certified terminal 22 is capable of doing so since it will receive the signals sent by the mobile telephone 3. As the case may be, it will manage or not manage the mobile telephone.

The sub-program for measuring the validity of the terminal could include a deciphering operation in the mobile telephone, using a secret code contained in this mobile telephone. This would be an operation to decipher information on the parameters of the certified terminal (especially its identity BA1, the name of the operator and the identity Ci of the cell) stored in this certified terminal. This information would be stored in the certified terminal only by being enciphered by an enciphering code whose mobile telephone has the key in the form of this secret code. After deciphering, the mobile telephone ascertains that the identity or the parameters of the terminal 22 are in its memory 13.

In a complementary way, the terminal 22, after neutralizing a mobile telephone 3 may inform the central circuit 2, for example through the network 25, so that this circuit 2 can use the ancillary circuits 8 to direct all the calls destined for the telephone 3, which have just been neutralized, to a voice message system. During this call, it is also possible to ascertain that the certification conditions of the terminal 22 are still valid and/or modify them.

It can also be accepted that the certified terminals 22 are capable of entering into radio dialog with the infrastructure of the terminals B1 to BN for purposes of authentication and parametrization. They are then provided with a captive mobile telephone function which, of course, is not neutralized and is dedicated to an operation for signaling authentication and parametrization (i.e. to the exclusion of useful traffic such as vocal traffic). In this case, they are, for example, themselves provided with a mobile telephone that is captive in the certified terminal. This method is useful if certain certified terminals are permitted to be mobile units and to change cells, or else if an operator often changes the topology of his cells.

Then, the certified terminals can be provided with a system of localization/authentication by which the network of terminals B1 to BN localizes/authenticates the certified terminal. This system is similar to the one wherein the network localizes/authenticates a mobile. As needed, the parametrization itself is possible through the mobile telephony network.

The chip card 24 of the terminal 22 contains an algorithm and a key. The key corresponding to a terminal 22 is entered into the central circuit 2 in association with the identity of this terminal in the recording 36. From time to time, the terminal 22 makes its presence known to the cell by radio. The cell, for example a terminal B2, sends a random number. The terminal 22 returns a computation result performed on this number by the algorithm and the key. The terminal B2 and/or the central circuit 2 check the computation with the one made from the key declared in the system. The cell updates its list of certified terminals and the mobile telephones can carry out their check as before. Or else, the cell gives the terminal a validation command or an extinguishing command. The mobiles then no longer need to carry out the check by themselves.

It may be envisaged that certain types of terminals 22 will not require any individual verification by the mobiles. However, an overall control by the cell may be retained. This overall control will be done with the cooperation of the mobiles. To this end, the terminal B2 of the cell Ci delivers general instructions pertaining to the terminals. These instructions will entail a general prohibition of the presence of any terminals in this cell or authorization for certain classes of certified terminals (for example they may

prohibit restaurant terminals but not hospital terminals, etc.). The mobiles then apply these instructions and ignore the terminals thus set aside.

The operator may broadcast various pieces of information in his cells, influencing the operation of the mobiles, independently of or in cooperation with the certified terminals 22. First of all, if the operator has chosen to resolve a general problem by adjusting the infrastructure, without the help of the terminals, then he broadcasts a certain degree of general inhibition of the mobiles in the cell. For example, he orders acoustic silence for the mobiles of a non-priority class throughout the cell. Or else, using the list 20 of functions permitted by the terminal, he may exclude certain inhibitions that had been granted to the terminal but are now no longer granted to the terminal (and yet remain stored in the zone 33). In this case, the mobile that receives these inhibition instructions ignores them.

Finally, the operator may have temporarily authorized an inhibition by a certified terminal and then changed his mind after studying the case or detecting a problem in the field. The operator may then broadcast a black list of terminals to be ignored in the cell in which the terminal is located, or remove them from the list 18 which, from this point of view, will be a blank list.

In short, the behavior of the mobile results from the comparison that it makes itself, of its own characteristics, its subscriber characteristics, especially contained in its SIM card in GSM mode, and information broadcast by the operator to the cell by means of the terminal B2 with local rights expressed by certified terminals 22.

The mobile telephones will preferably be capable of working without ringing sounds, and will use vibrators, answering machines, display units, SMS, etc.

Depending on the shape of the area, the terminal radiates throughout the area or else has perimeter antennas (at each gate). The operation then differs slightly. In the former case, if the mobile is idle, it can be allowed to get activated of its own accord according to its internal sporadic listening algorithm and then pick up normal signals and signals from the terminal 22. In the latter case, the mobile should be capable of instantaneously picking up signals when passing through the gate.

The fact of choosing the neighborhood of the certified cell to constitute a certification code (which is tested by the mobile telephones) enables an operator to wield full control in a simple way over the use of the terminals certified by himself. As a variant, rather than using the LAC-CI information, it is possible, in the recognition code, to use the identities of the neighboring stations B1 to BN, which are known to the mobile and should be reported to it by the certified terminal.

CLAIMS :

1. Method for the management of traffic in a mobile telephony network in which:

- communications terminals are installed in a territory to enter into communication with mobile telephones,

- circuits of these terminals are parametrized in order that they may correspond to an expected use,

characterized in that:

- parametrizing signals are transmitted to certified communications terminals to parametrize these certified terminals, this parametrization configuring these certified terminals for an expected used of a type different from that of the communications terminals.

2. Method according to claim 1, characterized in that the parametrization signals are transmitted by a telephone link.

3. Method according to one of the claims 1 to 2, characterized in that the parametrization signals are transmitted by a removable chip card.

4. Method according to one of the claims 1 to 3, characterized in that

- information is sent to a mobile telephone, through a certified telephone, about parameters of this certified terminal,

- the validity of the certified terminal that has transmitted this information is verified in this mobile telephone.,

- the communication of this mobile telephone is organized as a function of these parameters.

5. Method according to claim 4 characterized in that

- information for the verification of the certified terminal is sent to the mobile telephone from other communications terminals of the network.

6. Method according to one of the claims 4 to 5, characterized in that

- by organizing the communication, the operation of the mobile telephone is inhibited.

7. Method according to one of the claims 4 to 6 characterized in that

- the mobile telephone sends signals representing its identity, and

- the certified terminal transmits signals corresponding to this identity to organize the communication of a mobile telephone that has sent such signals representing its identity.

8. Method according to one of the claims 4 to 7, characterized in that

- to carry out the verification, a secret code contained in this mobile telephone is used for the deciphering, in this mobile telephone, of the information on parameters of this certified terminal.

9. Method according to one of the claims 4 to 8, characterized in that

- a list of certified terminals is stored, preferably in a memory of a mobile telephone, and

- for the verification, it is ascertained that an identity of the certified terminal is in this list.

10. Method according to one of the claims 4 to 9, characterized in that

- in a memory of the mobile telephone, there is stored an identity of the cell in which this mobile telephone is located, this identity being transmitted by a communications terminal, and

- for verification, it is ascertained that a cell identity transmitted by the certified terminal is identical to the stored identity of the cell.

11. Method according to one of the claims 4 to 10, characterized in that

- a list of functions permitted to the certified terminal is stored in a memory of a mobile telephone, and

- among the functions dictated by this certified terminal on the mobile telephone, those that are in this list are implemented.

12. Method according to one of the claims 4 to 11, characterized in that

- the certified terminal sends the network a piece of information on an identity of a mobile telephone for which it has organized the communication.

13. Method according to one of the claims 1 to 12, characterized in that

- a communication is set up between an authorized terminal of the network and a certified terminal, and

- a certification of the certified terminal is verified during this communication.

14. Method substantially as hereinbefore described with reference to figure 1.

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INVESTOR IN PEOPLE

Application No: GB 0015061.5 **Examiner:** Glyn Hughes
Claims searched: 1 to 14 **Date of search:** 10 January 2001

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.S): H4L (LDDDM)

Int Cl (Ed.7): H04Q 7/38

Other: Online: WPI, JAPIO, EPODOC

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X, E	GB 2344971 A	(NEC) see whole document	1, 6, 7, 11
X	GB 2317304 A	(NEC) see in particular page 14 line 4 to page 15 line 2	1, 6, 7

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.